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Dr. Hartshorne is an assistant professor of geography, University of Minnesota, and is a frequent contributor to the science of geography as well as its educational aspects. Among his contributions may be mentioned here, Location Factors in the Iron and Steel Industry, *Economic Geography*, July, 1928; The Iron and Steel Industry of the United States, JOURNAL OF GEOGRAPHY, April, 1929; The Upper Silesian Industrial District, *Geographical Review*, July, 1934.

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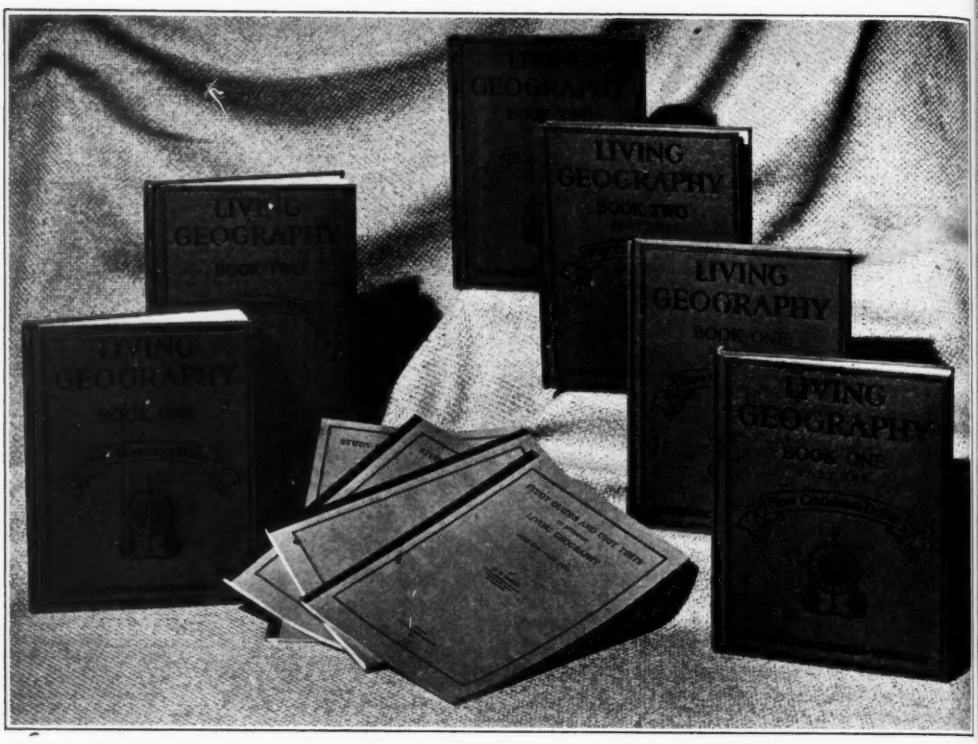

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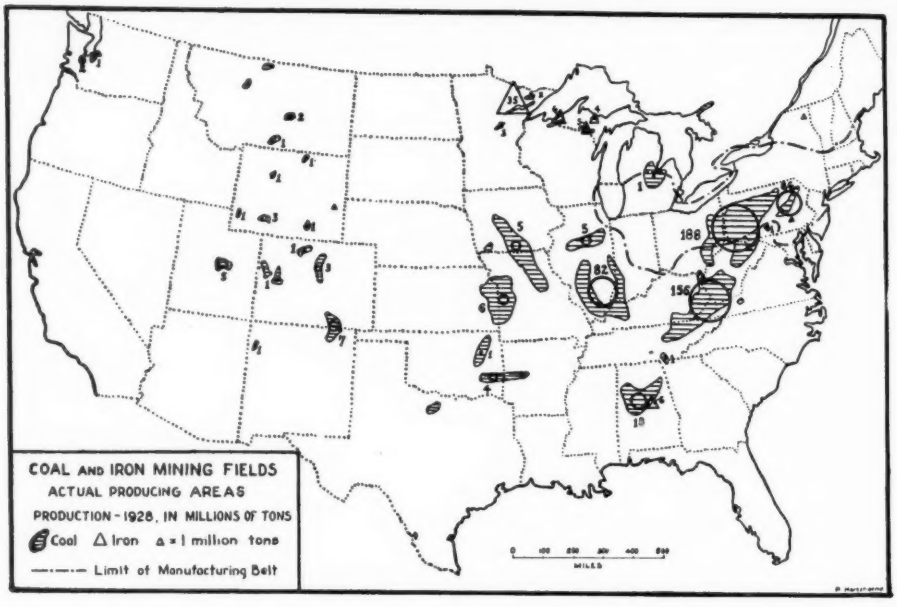
VOLUME XXXIV JANUARY, 1935 NUMBER 1

COAL AND IRON MINING DISTRICTS OF THE UNITED STATES AND WESTERN EUROPE

RICHARD HARTSHORNE
University of Minnesota

Maps showing the outlines of coal and iron ore fields are readily available in many texts and atlases. Less common are maps showing the areas in which mining is actually carried on. But most significant from many points of view are maps showing the relative importance of development in the different mining districts, and these are extremely rare. Probably most teachers rely on statistical sources which give production by country or state, seldom by district. The maps in the World Atlas of Commercial Geology[1] did fulfill that purpose, but they are now somewhat out of date (1913) and the map of Europe is confusing because of the pre-war boundaries. Furthermore it is difficult to compare the iron mining districts with the coal mining districts on separate small-scale maps. To show these important areas in greater detail, as well as on a more recent basis, the accompanying detailed maps were made of the two regions in which more than three-fourths of all the coal and iron ore of the world are mined. These two minerals were chosen, and shown together, because of their dominant place among all the minerals in affecting the location and development of modern industry.

The relative importance of different mining districts could conceivably be measured in terms either of the number of mines, or shafts, or of the number of miners, or of the amount of the products. The first measure is quite unsatisfactory, because of the great differences in the size of mines, and, in any case, is impracticable. A map of "mining population" in the United States might prove very instructive, but comparable statistics are not readily available for many other countries. The maps used here are therefore based solely on the tonnage of production.[2] It was not possible to make



any allowance for differences in grade of ores or quality of coal, excepting in the case of lignite. The year 1928 was selected in preference to any later year because the abnormal economic conditions since 1929 would presumably lessen the significance of the maps. The maps are explained in detail in the following pages.

Only the actual producing areas are shown and the relative importance of the different districts is indicated both by the figures of production, in millions of tons, and by circles or rectangles proportionate in area to those amounts.

The areas shown on the two main maps—Western Europe and the United States—produced, in 1928, 75 per cent of the world's total coal production and 82 per cent of its iron ore production. There are comparatively few districts of major importance in coal and iron mining not included within these two regions. The only other coal mining areas producing 10 million tons or more are: the Donetz basin in Soviet Ukraine, the Kyushu field in Japan, the Raniganj-Jharia field in India (northwest of Calcutta), the Transvaal-Natal field in the Union of South Africa, and the New South Wales field in Australia. Iron mining districts of two million tons production or more are: the Krivoi Rog district in Soviet Ukraine, the Norrbotten district in northern Sweden, and the Viscayan district on the north coast of Spain. (See Table 1.)

TABLE 1

WORLD PRODUCTION OF COAL AND IRON, 1929
(in millions of tons)

	*Coal**	*Iron ore*	*Pig iron*
United States	552	74	43
Canada—Newfoundland	13	1½	1
Chile	1½	1½	—
Great Britain	262	13	8
France	54	51	10
Belgium—Luxemburg	27	8	7
Netherlands	12	—	—
Saar	14	—	2
Germany	191	6	13
Austria	1	2	½
Czechoslovakia	22	2	1½
Poland	46	½	½
Sweden	½	11	½
Spain	7	6	½
Italy	½	½	½
Other Europe	5	2	1
U.S.S.R.	43	7	4
Fr. N. W. Africa	—	3	—
Spanish Morocco	—	1	—
India	24	2	1
China	25	1	—
Japan	34	—	1½
Other E. Asia	8	1½	½
Australia	11	½	—
Union So. Africa	13	—	—
All other	4	1	3
World total	1381	c. 200	99
Percentage production by World Regions:			
Eastern North America	38	37	43
Western Europe	45	50	45
Total North Atlantic	83	87	87
Remaining America	3	1½	1
All others	14	11½	12
Total	100	100	100

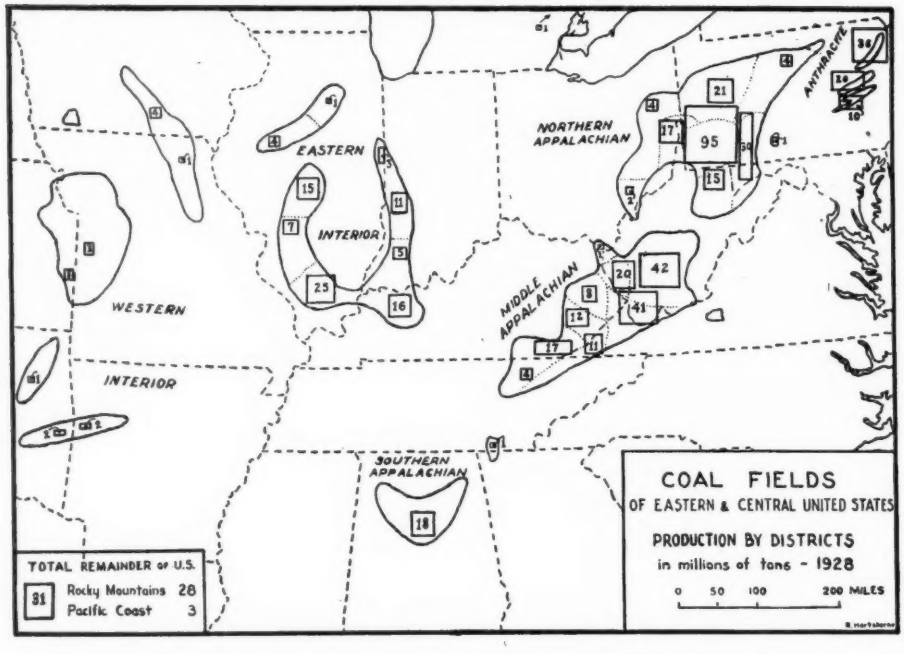
* Including lignite, reduced to coal equivalent.

Compiled from U. S. Bureau of Mines: Mineral Resources of the United States.

COAL IN UNITED STATES

The coal map for the United States reveals the extraordinary importance of two fields, the Northern and Middle Appalachian,

each producing far more coal than any foreign country other than England and Germany. Two other fields, the Eastern Interior Field and the Pennsylvania Anthracite Field, are considerably less important than those, but still produce more coal than any foreign countries other than the two mentioned. In proportion to the area of the fields the production is surprisingly small in the Southern Appalachian (Alabama) and the scattered districts of the Western Interior. Particularly noteworthy is the small production in the



Western half of the country (west of the 100th meridian). The Pacific Coast, with approximately five per cent of the population of the country, and most removed from other coal areas, produces less than one per cent of the country's coal.

Most of the coal mined in the western half of the country is low-rank bituminous and sub-bituminous coal which is also of low-grade (i.e. high ash content). Much of the same is true of the Western Interior Field, with the exception of a small amount of semi-anthracite and semi-bituminous coal from Arkansas and Oklahoma. All of the Appalachian regions produce high-rank bituminous and semi-bituminous coals of the highest grade. Furthermore, excepting for a few districts in the Rocky Mountains, the Appalachian coals supply all the coking coal of the United States. The Eastern In-

terior coals are bituminous coals of intermediate rank and are not effective for coke.

If the coal fields of Canada were added to the map they would change it but little. The most important single district, that around Sydney, Nova Scotia, produced but 7 million tons and the total production for all Canada was only 18 million tons.

On the enlarged map for the eastern and central fields the production is indicated by separate districts.[3] Most extraordinary is the concentration of production in the central part of the Northern Appalachian Field, focussing on Pittsburgh. The Monongahela District, covering only a few counties in Pennsylvania and West Virginia, and directly tributary to Pittsburgh, produces alone more coal than any foreign country, again excepting England and Germany. In addition the four districts immediately surrounding this major district, taken together produce nearly as much again.

In the Middle Appalachian Field two districts, the Kanawha, and the Pocohontas-Clinch-Tug River district, each produce more coal than the entire western half of the United States.

The three main bituminous coal-fields of the United States extend across state boundaries. Two states, notably Kentucky, have producing areas in two fields. The importance of the different states in these fields is shown in the following table.

TABLE 2

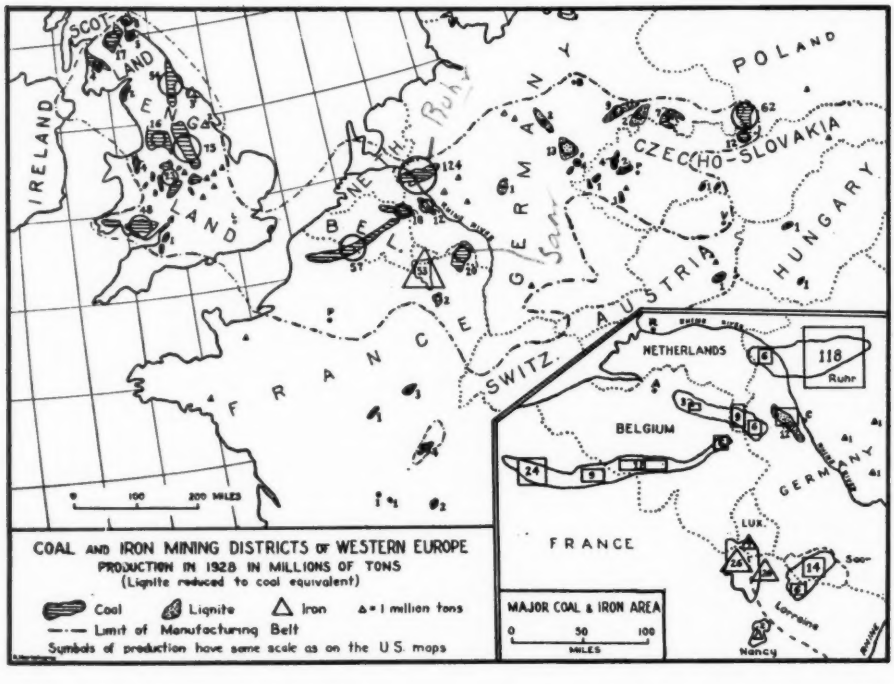
COAL PRODUCTION BY STATES IN THE PRINCIPAL INTERSTATE FIELDS
(millions of tons)

Northern Appalachian		Middle Appalachian		Eastern Interior	
Pennsylvania	131	West Virginia, southern	93	Illinois	55
West Virginia, northern	39	Kentucky, eastern	46	Indiana	16
Ohio	15	Virginia	12	Kentucky, Western	16
Maryland	4	Tennessee	7		
		Ohio	1		
Total	189	Total	157	Total	87

The complete separation of the Anthracite Field of Eastern Pennsylvania from the Northern Appalachian (bituminous) Field is to be noted. The three anthracite districts are each very limited in area, and production is more highly concentrated than in any of the bituminous fields. This field is unique among major producing fields of the world in that practically all of its production is of anthracite coal.

COAL IN EUROPE

In Europe there are two major coal-mining areas each considerably more important than the two major fields of the United States, and a third field comparable with the Eastern Interior Field. One of the two major areas extends diagonally across the island of Great Britain from the Newcastle district on the northeast coast of England to the coast of South Wales. As the map shows it includes three major districts each producing more than any United States



district other than the Monongahela (Pittsburgh) district, and a large number of minor ones. Most important is the Yorkshire Field. The total production of the whole area, approximately 220 million tons, ranks this as the greatest coal field of the world (tho far less than the Appalachian fields taken together of course). Of lesser importance are the nearby Scottish districts, totally 34 million. All of these fields produce bituminous coals of high grade; most of them produce excellent coking coal. The South Wales field produces much semi-bituminous and semi-anthracite coal and some anthracite.

The other main field of Europe, dominating the continent, is the Franco-Belgian-Westphalian Field, extending from northeastern France across Belgium and a corner of the Netherlands into

western Germany. With a production of about 200 million tons this was second in the world only to the English-Welsh area. In rank and quality of coal it is similar to that area, its coal ranging from bituminous to semi-anthracite, with much excellent coking coal. Over half its production came from one district, the Ruhr, which with its production of 118 million tons was the greatest coal district of the world. Coal mining in the Franco-Belgian portion of the field extends across the international boundary line. Similarly the third and least area extends without a break from Belgium across Dutch Limburg into Germany. (The boundaries here are essentially the same as before the war.)

Not far from these areas, but not included with them, is the Saar Coal Field, most of it temporarily separated in a non-national area under control of the League of Nations.[4] It produces bituminous coal of fair quality for other than coking purposes. This deficiency however makes it of much less importance to the iron ores of Lorraine than is commonly supposed.

The third field of Europe is the Upper Silesian field, near the borders of Eastern Europe. With a total production of 74 million tons this was less important than our Eastern Interior Field, tho much more concentrated. Tho small in area it is also divided internationally. The larger part of the area was formerly in Germany (Upper Silesia proper) but extended eastward into Russian Poland (the Dombrowa district) and Austrian Poland (the Krakow district) and southward into Austria (the Ostrava-Karwina district). In addition to the two unquestionably Polish districts the new Poland received the greater part of the former German area and is now the chief producer in this field, mining roughly 40 million tons, most of it in Polish Upper Silesia). The portion remaining to Germany produced 22 million tons, and Czechoslovakia, which inherited the Ostrava-Karwina district, 12 million tons. Most of the coal is bituminous of high grade, but relatively little of it is good for coking.

The fourth coal field of Europe, as already noted, is not shown on the map. This field, the Donetz Basin, produced about 25 million tons in 1928; since then, in contrast to the rest of the world, has increased its production to over 30 million. The coal is of high grade and ranges from bituminous to anthracite.

Minor fields, of small scattered districts, are to be noted in two areas. Those around the highland of south central France produced 12 million tons, slightly less than the Western Interior Field in the United States. Those on either side of the mountains separat-

ing Germany and Bohemia (Czechoslovakia) produced about the same total, most of it, however, of low grade sub-bituminous coal. More important than these are the lignite fields extending across central Germany and Bohemia, from the Rhine to the Oder, with the greatest development in Saxony. The total production of the entire belt was about 185 million tons of lignite, the equivalent, as fuel, to 41 million tons of coal. (The figures shown on the map for the lignite districts represent the equivalent in tons of coal of the lignite mined, according to the ratio: 4½ tons of lignite equivalent to one ton of coal.[5])

IRON PRODUCING REGIONS

The same maps show the location of the principal iron mining districts, which are to be considered in connection with the coal fields. There are but two major iron-mining areas in the world: the Upper Lakes Region in the United States, and the Lorraine Region in Western Europe. Each of these regions produced 53 million tons of ore in 1928 (together, 60 per cent of world total), but that of the Upper Lakes Region averages over 50 per cent iron whereas the Minnette ores of Lorraine run 30-35 per cent, so that the amount of iron produced is much greater in the American area.

Two-thirds of the iron ore produced in the Upper Lakes Region was mined on the Mesabi Range in Minnesota the world's richest iron-mining district. Most of the remainder came from three small districts in the Upper Peninsula of Michigan, producing 15 million tons (including one million in the Wisconsin part of the Gogebic Range) or slightly less than the total production of the British Empire.

Much less important is the Birmingham, Alabama district, with a production about equal to that of Germany or of all of the Soviet Union (in 1928; since then the latter is somewhat larger). Only one other district in the United States produced a million tons, the Cornwall mine in Eastern Pennsylvania; somewhat less was mined in the Adirondack area in New York. Three scattered mines in Wyoming, Utah and New Mexico produced a total of one million tons for the entire western half of the United States.

One other district in North America is important: the Wabana mine in Conception Bay, Newfoundland. Of its 1½ million tons annual production over half is sent to Germany, the remainder to the furnaces in the Sydney, Nova Scotia, coal-field. In all of Spanish America the only important production is that of 1½ million tons

from mines in northern Chile, and ½ million tons from Cuba, both from mines fairly close to the sea, and under American business control. (One of the largest ore reserves of the world is in Minas Geraes, Brazil, as yet quite undeveloped.)

The Lorraine ore field, like the Upper Silesian Coal Field, straddles international boundaries which were changed as a result of the War. Previously the most important part was in Germany (marked Lorraine on the map); a second part in France, and a minor part in Luxemburg, an independent duchy economically, however, united with Germany. The small Belgian corner was, and is, insignificant. The ore beds dip toward the west so that those on the French side were early considered valueless, but have come to surpass those in the former German area. Both these major parts, however, are now included in France, together with the nearby Nancy district. Luxemburg has been shifted to economic union with Belgium, so that Germany now has no part in this ore field, tho much of the production, both as ore and as raw (pig-) iron is shipped to the Ruhr area in Germany.

Altho the "Minnette" ores of Lorraine are low in iron content they have the advantage of being "self-fluxing" because of their lime content.

Much less important are the iron mines of Great Britain, once the most important of Europe, if not of the world. A belt lying partly along the margin of the coal belt, partly southwest of it, includes many scattered districts of relatively small production, totally however about 11 million tons, less than that of Michigan, but more than any country other than the two great producers: the United States and France. Nearly as much is normally produced in Sweden, most of it in the far north, and exported to Great Britain and Germany.

Germany has no major iron-mining district left, but a number of scattered districts in the west produce a total of 6 million tons. Roughly similar amounts were produced in the former area of Austria-Hungary, now divided between Austria, Czechoslovakia, and Poland, in Spain, in Sweden and in the Soviet Union. Italy could obtain but ½ million tons, from mines on the island of Elba. Also important for Europe is the production from various districts in Morocco, Algeria, and Tunisia, chiefly under French control.

Particularly striking is the small production in the Orient: less than 2 million tons in Sino-Japanese areas, under 3 million tons from India and other British areas.[6]

MANUFACTURING BELTS

The maps also show the two major manufacturing belts of the world. The relation of these to the coal and iron-mining areas can readily be seen. On the map for Europe the boundary of the manufacturing belt looks as tho drawn simply around the mining areas. Actually it is based on the percentage of the total working population engaged in manufacturing.[7] But it does include all the major coal and iron ore fields of Western Europe, in which the greatest heavy industry is developed.[8] In addition, the great capitals—London, Paris, Berlin, and Vienna—tho outside the coal fields are near them, and as great transportation centers have become also major manufacturing centers. In the middle of the belt the boundary swings south to include the historic area of light manufacturing in Southern Germany and the plain of Switzerland. In central France, the St. Etienne-Lyons area constitutes an isolated district. The considerable industrial development of Northern Italy—notably in Milan and Turin—is not sufficiently important in proportion to the population to be included on the map.

In North America the correlation between the coal and iron areas and the manufacturing belt[9] is not so close. Nevertheless nearly half the coal of the United States is produced within that belt and nearly as much again within 200 miles of it, so that within the areas immediately tributary to that belt about 90 per cent of the country's coal is mined. The particular importance of the Northern Appalachian Field to the manufacturing area is obvious.

Even more so than in Europe, the largest cities lie not in the coal fields, but near them. Pittsburgh is the only major exception. The great cities of North America (over a million population) with one exception on the Pacific Coast, are all located along the *border* of this belt: Boston, New York, Philadelphia, Chicago, Detroit, and Cleveland. A half dozen or more large cities of lesser rank mark the boundary of the belt, indicating the attraction to manufacturing, of major transportation centers *close* to the general manufacturing belt. Similar centers farther removed—Minneapolis, St. Paul, Kansas City, San Francisco, etc.—have a manufacturing development small in proportion to the size of the cities. An exception, which should perhaps be marked as an isolated district, is St. Louis.

In general the portion of the belt west of a line thru central Ohio is less developed than the eastern portions. The northeastern part of the area, from Toronto to Boston, is somewhat similar to the area of South Germany and Switzerland in being somewhat

outside the area most favored for coal, and is consequently more dependent on light manufacturing and the use of water power.

The one all-important iron ore field is at a surprising distance from the manufacturing belt. But the navigability of the Great Lakes and the unusually efficient transport means developed on them have tended to greatly decrease the significance of that fact. For example, the cost of moving ore by lake from Duluth to either Chicago or Buffalo is about that of bringing it from mines on the Mesabi to Duluth. The Upper Lakes Region, therefore, has a locus in relation to the middle part of the manufacturing belt, Pittsburgh-Buffalo, equivalent to a land distance of but little over a hundred miles beyond its northern margin.

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[1] U. S. Geol. Surv.: World Atlas of Commercial Geology. Washington, 1921.

[2] The maps are based on detailed statistics, for the United States by counties, for European countries by departments or provinces, and maps in: U. S. Bur. Mines: Mineral Resources of the United States; A. H. Brooks, and LaCroix, Iron and Associated Industries of Lorraine, etc., Bull. 703, U. S. Geol. Surv.; Official statistical yearbooks of the European countries mapped.

[3] The districts outlined on the maps are based largely on the classification indicated in Mineral Resources of the United States, 1928, Pt. ii, pp. 455-6, 542-56, 581-5.

[4] According to the Treaty of Versailles a plebiscite is to be taken in this area in 1935 to determine its future status, either to join France, rejoin Germany, or remain as at present.

[5] The ratio used in the League of Nations memorandum for the World Economic Conference at Geneva. It is claimed that this places too low a value on the lignite of Bohemia where the ratio of 7:4 is recommended by B. Decken, Die Wirtschaft der Tschechoslowakei. München 1928.

[6] For resources of coal and iron in the Orient see H. F. Bain, *Ores and Industry of the Far East.* New York, 1927.

[7] The areas included are those with over 40 per cent of the total gainfully employed, employed in manufacturing and mining. Compiled, by departments, etc., from the statistical yearbooks of the countries shown.

[8] For the relation of the basic heavy industry, iron and steel, to the mining areas, see W. O. Blanchard, The Iron and Steel Industry of Europe, *Journal of Geography*, Oct., 1928, pp. 247-62; R. Hartshorne, The Iron and Steel Industry of the United States, *Journal of Geography*, April, 1929, pp. 133-52.

[9] The area in which cities of 10,000 or more have over ten per cent of their total *population* employed in manufacturing. On this basis St. Louis is the only major manufacturing center outside the belt, but the cities between St. Louis and Chicago are excluded.

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"The fishing boats and pleasure yachts here in Table Bay lie motionless in the hot summer sunshine. The Christmas dinner is now over, and the children are playing with their toys, as we send greetings to our fellow South Africans all over the world, and to our sovereign in London, King George V."

So ran the Christmas radio message from the Union of South Africa. From cold northern regions sounded the chimes of Amsterdam palace, while a speaker addressed his world friends in the Dutch language. A program was broadcast from a little Benedictine monastery in Beuran, Germany. And from the snowy South Polar region, Commander Byrd and his adventurous crew greeted their loved ones at home and sang brave Christmas carols which carried over the waves of atmosphere to all parts of the earth.

As the world radio net reminds us that people of distant lands are closely connected to us by air, so the great ocean vessels bringing cargoes from the four quarters of the earth tell us of the great network of commercial routes which tie the world together.

It is our aim to present to you, the romance of the loaded ships. May we take you to the busy wharves of western Brooklyn in New York Harbor?

The first scene shows us three school children, Jack, Bob and Mary, watching the unloading of goods from across the ocean.

SCENE I

Characters: Bob, Mary and Jack three school children (Jack is the oldest).

Children packed as commodities, Paper Base Stock, Sugar and Coffee. Voice of stevedore off stage.

Background: Brooklyn docks, with pier-sheds, end of ocean liner.

Set: Planks down which cargoes may be unloaded from both sides of stage. Barrels. Pile heads where ships are tied.

* Written and produced at Roosevelt Junior High School, February, 1934.

Enter Bob, Jack and Mary.

Hoarse horn of ocean liner just entering her berth.

The three children gaze with excited eagerness, first all around and then in the direction of the vessel off-stage to the right.

Mary: (*Looking around*) My! it takes a lot of ships to bring us all the things Uncle Sam needs.

Jack: (*Points to right off stage*) Here's one just docking.

Bob: Gee, what a big ship!

Jack: I've never seen one quite so large.

Mary: Oh, I wish we could go on board. Jack, do you think they'll let us?

Jack: I'm afraid they'll be too busy unloading.

Bob: But it will be fun to watch and see what comes off.

Mary: That boat over there flies the Union Jack. Maybe it's bringing china dishes from England.

Bob: Dishes, huh. Wouldn't a girl think of that? I suppose if it flew the German flag, you'd say it was bringing dolls or canaries.

Mary: Well, what then?

Bob: Can't you think of something more important than that?

Jack: Our country imports large amounts of silk, rubber, coffee and wool.

Bob: I say it carries a cargo of rubber from the East Indies.

Jack: But here is a vessel with the Swedish flag and I wonder what it brings us. There go the stevedores. Now watch. (*The children crowd closer toward the ship.*)

Voice off stage: Hey. What are you kids doing down there? Clear out of the way. We gotta unload.

Bob: (*Astonished*) Do you see what I see? (*Children jump aside as a package labelled "Paper Base Stock" comes "running" down the plank.*)

Jack: Hello. What's this?

Paper Base Stock: Hello children: I heard you asking some questions. I'm wood-pulp. (*Mary points to printing on package.*)

Paper Stock: Yes, paper base stock is just another name for me.

Bob: You're made from wood? (*Paper Stock nods.*)

Paper Stock: Do you remember all the sheets of Sunday paper you left lying around the living room?

Bob: Yes, what of it? (*Mary gently silences him.*)

Paper Stock: And do you remember all the brown paper bags you helped your mother carry home from the grocer's? Well, I've

come all the way from the forests of Sweden so you can have another Sunday paper and more paper bags next week.

Mary: Why, that's news to me. Our country is ever so much bigger than yours and we have forests in The Pacific Northwest and in The South and in northern Michigan and Wisconsin.

Paper Stock: Yes, it's often news to some of you Americans to learn that you can't produce all the things of all the kinds you use.

Mary: But don't your people in Sweden need wood for their own use?

Paper Stock: Yes, but we haven't so many people to supply and we have an abundance of trees on our cool mountain slopes. Well, that stevedore shoved me toward this warehouse. I may meet you again. Good-bye. (*Takes sliding steps.*)

Bob: So long. See you in the funny paper.

Mary: Well Bob, do you supose paper stock is an important United States import?

Bob: I'll bet it is. I've carried tons of paper myself on my news-boy route.

Jack: When you stop to think of the *New York Times* alone in our city, and then of the thousands of other large city newspapers all over the country you wonder that even the foreign countries have any paper material left.

Mary: I like to watch the ships unload. (*Points*) What does that vessel bring?

Bob: Well, Miss Brown said that Australia, Asia, South America, and Cuba land things at these Brooklyn piers.

Jack: (*Wisely*) Do you think you can guess what's in this ship from Cuba?

Mary: Do you supose it's tobacco from Havana? (*Sack of raw sugar turns two somersaults down a second plank at right, knocking Bob over.*)

Bob: You're a sweet one, taking me off my feet this way.

Sugar: I admit I'm a sweet one. I've come from Cuba to fill your sugar bowl. What could be sweeter than that?

Mary: Are you sure we need you? In my United States geography I learned that Louisiana and Texas have sugar cane plantations; and Colorado, Wisconsin and Michigan produce beet sugar.

Sugar: True, but you and the rest of your Uncle Sam's family have such a sweet tooth that of the 6,000,000 tons of sugar you consumed in 1931, only 22 per cent was produced within the United

States and, of the remainder, 46 per cent came from Cuba.

Jack: Well, you had a short, cheap ride. That's one good thing.

Bob: Is it hot all the year where you grow?

Mary: Do you have much rain?

Sugar: Yes, we need heavy rain. The rain comes down in May, six inches of it; the rain comes down in June, seven inches; the rain comes down in July, and so on until October. Then the weather is dry and that helps more sugar to form in the cane stalks and also makes it easier for the oxen to pull loads of cane from the fields.

Jack: Does Jack Frost ever hurt the crop?

Sugar: I never heard of him.

Mary: Oh, he means freezing weather.

Sugar: No indeed. Cane is never killed by cold weather there, so it needs to be planted only once every five or six years. That's another reason why it is a good crop for Cuba to grow.

Mary: Well, I'm glad we have a sugar growing neighbor, for I like heaps of sugar on my oatmeal, and I like a certain sugar refiner's slogan: "A candy shop in every block."

Jack: You are a popular kid, Sugar, and it looks as tho you are on our list of the ten leaders. By the way, where are you going now?

Sugar: Can you guess? You may not recognize me but you will be sure to like me when we meet again. I'll be much more refined than I am now.

Bob: Look, what is this coming now? (*Coffee comes tumbling down a plank from the left.*)

Bob: What next? Are you wool?

Mary: Are you spice?

Coffee: Neither of those. I'll tell you something about myself and then see how well you know your geography. I can grow on rich red soils and well drained slopes either in high places well within the tropical zone or in lower places at the edge of the tropical belt.

Mary: Where did you come from?

Coffee: From an important producing area in south-eastern Brazil, from the port of Santos. (*Points to name on bag.*) I grew in the plateau not far from Sao Paulo City, in the state of that name. (*Points to name on bag.*) Now do you know who I am?

Jack: (*Quickly*) Yes, we do.

Bob: You're the coffee father and mother drink for breakfast every morning.

Mary: I know the United States hasn't the right conditions for growing you.
Coffee: Right. That's why I'm here.
Mary: (*Pointing to words on bag*) But why doesn't it say "Coffee" on your bag?
Coffee: (*Pointing to word "Cafe"*) Cafe is the Spanish word for coffee. I must roll along.
Jack: Just a minute. How do you manage to learn two languages?
Coffee: Oh, I just use my bean.
Bob: Please won't you teach us more?
Coffee: Story, I'm dated to reach that warehouse in just two minutes. Buenas dias. (*Exit Coffee*)
Jack: Coffee, sugar, wood pulp. What else do the ships bring in? (*Two busy stevedores hurry by.*)
Bob: Maybe these men can tell us. Say, Mister, what are those ships over there unloading? (*Points to oposite side of stage.*)
Stevedore: Go over and see.
Jack: I say, let's take the ferry across the harbor and see what's landing on the Jersey side.
Mary: Good, we can spend the afternoon over there and be home by five o'clock.
Bob: Let's go. (*Hurry off toward right.*)

Curtain

SCENE II

A passenger ferry going westward from Brooklyn to the Jersey shore. A railing suggests the boat. Passengers walk on and stand about or stroll, gazing at harbor sights, bracing themselves as tho on a moving boat.

Announcer: Scene two shows a passenger ferry crossing Upper New York Bay from the Brooklyn docks to the New Jersey shore. The characters are the three school children, Jack, Bob, and Mary, and other passengers, namely, an Italian musician, a newsboy, a boot-black, an apple woman, farmer, waif, business men and shoppers. *Bob, Jack, and Mary rush on to the ferry first.*
Mary: Now we are going places and seeing things. (*Excitedly*)
Jack: What do you two expect to see on the Jersey side?
Mary: Rubber from South America.
Bob: There probably will be some rubber from South America, but I don't believe much comes from there. Do you know, Jack?

Jack: Yes, very little comes from South America; ninety per cent of our rubber now comes from plantations in the peninsula and islands of southeastern Asia.

Mary: But I've always heard—

Jack: (*Shakes head, No.*) The wild rubber trees of Brazil produce very little of the world's total. Ten years from now the story may be different.

Mary: Will there be raw silk and some wool?

Jack: We'll talk about that later.

Business men, shopping women, newsboy selling papers, man with piano accordian and tin cup, bootblack with traveling outfit all move on to ferry. Newsboy sells a paper here and there. Business men read papers or pretend to converse. Some point to harbor sights. Bootblack walks about and finally gets a customer. Man plays Italian tunes on accordian, and some people put coins in his cup; he plays "Sidewalks of New York" and waif dances to it.

Finally crowd drifts toward ferry exit at left of stage ready for landing on Jersey side.

Bob: Here we are.

Newsboy: Paper here. *Times.*

Gang-Plank. All Exit.

Curtain

SCENE III

Announcer: Scene III shows the docks of the New Jersey shore. On the Jersey shore one commodity is unloaded, chiefly at Perth Amboy; another comes in vast quantities to Bayonne; many chemicals come to Staten Island, another product stops at Hoboken, and another on the Passaic River. For convenience, the commodities will all appear in this one dock scene. The new characters in this scene are Copper, Rubber, Silk, and Petroleum.

Enter Bob, Jack and Mary.

A business man hurries by.

Jack: Excuse me Sir, but would you please tell me where this ship comes from?

Business Man: Surely son. This ship comes from Chile, South America.

Jack: Thank you sir. Did you hear him?

Bob: If I remember correctly minerals come from there. (*Two stevedores carry in a heavy load of copper.*)

Mary: Copper, of course, for electric wires and fixtures.

Jack: Are you from Chile?

Copper: Yes, from Chuquicamata. Practice up on that when you have a day off.

Jack: I'll need a whole day.

Copper: It looks strange here in your land. What are those big things? (*Points to skyscrapers.*)

Bob: Those are the skyscrapers of Manhattan.

Copper: Good name for them. I'm used to high places, but, high firm mountains.

Mary: Please tell us about your country and your trip.

Copper: Well, little rain falls; there's not much for people to eat; and it is a two-hundred mile, down-grade railroad journey to the coast.

Bob: And from there?

Copper: Northward, across the equator, thru the Panama Canal, Caribbean Sea, Atlantic Ocean, and here I am.

Jack: I see. That makes foreign copper easier to get for our New Jersey electrical manufactures, than to get it by rail from Arizona, Utah or Montana.

Bob: I should think that would make our western copper companies angry.

Jack: It does.

A ship flying the British flag. (*A 20-inch package labelled "Rubber" bounces down the plank.*)

Jack; My, how you bounce.

Rubber: You would too if you were I. I am rubber.

Bob: And this is Mary and here's Jack and I am Bob.

Rubber: (*Bows*) I hold a very big place among the products your Uncle Sam buys.

Mary: I know. We have more automobiles than any other country.

Bob: And I read the other day: one manufacturer says there are over 30,000 different articles produced in the United States from this one material.

Mary: But why don't we produce our own when we need so much?

Rubber: You wouldn't ask that if you once visited the hot, wet peninsula of Malay where I grew. We have over 80 inches of rainfall each year and the weather there is so hot, you wouldn't like it.

Jack: I see you traveled on a British steamer.

Bob: Please tell us how rubber is prepared for shipment.

Rubber: Well, sometimes the sap or latex is sprayed into the air of a cool room and falls to the floor in hardened flakes. Sometimes the liquid sap is exported in tank steamers, and it is also dried and packed in bales as you see me. I'd better bounce along.

Jack: We may meet you some day in father's car.

Mary: Oh, look! Do you supose that strange character speaks our language?

(*Bale of silk trips down the plank. It is wrapped in matting and has hair of raw silk.*)

Silk: (*Politely*) I do. Don't you know me? Guess.

Jack: I can't.

Silk: What product cost $17 a pound during the world war, and now is worth only $2 a pound? Travels in armored cars across the continent, drawn by the fastest engines? Of course I'm worth only $270 now, instead of $2,295.00, and I often travel by water thru the Panama Canal, because it's cheaper.

Mary: Well, of all things. And who are you?

Silk: I'm raised in farm house attics or in sheds in many parts of Honshu, reeled from a cocoon, packed in matting bales, and shipped from Yokohoma across the Pacific Ocean.

Mary: At last. You don't need to tell us.

Bob: Do your workers receive good wages?

Silk: No, they work for very little, so they raise silk for your people who would demand high wages. I must leave now. Good-bye. I may be in a silk dress when you see me again.

All three: Good-bye.

Jack: It's getting late. We'll see what's at this Bayonne dock and then we must start for home. Hello, here's a petroleum vessel from Mexico, unloading thru pipes.

Mary: Why does our country buy that?

Jack: See, we have huge refineries here.

Petroleum: (*Enters*) I'm just crude oil from a foreign country and I've come to be refined in your busy city.

Bob: What do you mean by being "refined"?

Petroleum: I shall be made into gasoline, vaseline, paraffin, axle grease, etc. Then I will be sold here in the United States or else sent to foreign countries, perhaps to Europe. I must go, good-bye.

Children: Good-bye.

Jack: That's another one we may meet again in father's car.

Bob: (*Slowly*) I've been thinking. It's no wonder so many people can live and work here around our city, with all these goods com-

ing in to be used; petroleum refined, silk made into cloth, paper manufactured, and all the rest.

Jack: Yes, I read that half of the sugar we import is refined in New York.

Mary: There's the ferry. (*All three hurry off stage.*)

SCENE IV

Announcer: This scene shows the three children and various other passengers going home from the Jersey Shore across New York Bay to Manhattan, late in the afternoon.

(*Ferry going east.*) *Enter Bob, Jack, and Mary.*

Mary: So many foreign countries are helping us to be better clothed and better fed. What would we do without our automobiles and raincoats and our pencils?

Bob: And what would you do without your sugar? By the way, do we send anything over to them?

Mary: Do they need us as much as we need them?

Jack: I'll tell the world they do. That's the other half of the story.

Bob: Some day perhaps we can come down to the harbor and see ships being loaded.

Mary: It seems to me since we need each other so much, that all the countries of the world ought to live together like one big happy family.

Bob: We can go home now and tell mother all about what we saw.

Passengers board ferry. Lights are dimmer than before. Newsboy sells a few papers. People have a tired look toward the close of the day. Blind violinist plays soft tunes. Finally, all on board move toward exit and leave boat.

FINAL CURTAIN

ADJUSTMENTS TO CLIMATE IN ALPINE MEDITERRANEAN ASIA

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The area considered in this paper, the "Alpine" mountain area of southwest Asia, lies between the Aegean Sea and the Indus lowland, including Anatolia, Armenia, Transcaucasia, Persia, Afghanistan, and Baluchistan. Varied conditions, especially of relief, give it climatic diversity. Winter rains associated with the infrequent passage of low pressure areas towards India, typifying and giving unity to the area, justify the term "Mediterranean." Both the distribution and the manner of life of the sparse population show decided response to climatic influences.

ANATOLIA

Northern Anatolia, with north winds the year round, receives considerable rain (Trabzon, 28″) especially on the north-facing slope of the Simali Anadolu (Pontus) Mountains. Lacking Caucasus protection few olives grow west of Sinope and tobacco likewise occupies more area towards the east. One assumes climate responsible for the tobacco quality that imported seed and soil failed to develop in United States. Excess above eight inches winter rain tends to reduce oil content of olives which temperatures limit to elevations chiefly less than one thousand feet. Where rain and relief permit or where water descends for irrigation, wheat, maize, and Mediterranean fruits cover considerable area. Malaria of stagnant swamps near Bursa led to government prohibition of rice growing there. Swampy malarial Samsun boasts an American hospital. Heavy rains mantling the Pontus with mixed forest, that leads some to delineate a "northern forest region," provide water power for sawmills. Deforested areas show where charcoal burners worked. The rain shadow south slope furnishes grass for stock and the piedmont transition to dry steppe, dry and irrigation farm land.

Physical complexity means climatic complexity in western Anatolia but the comparatively populous lowlands typify Mediterranean conditions and utilization. Cereals and fruits furnish subsistence but cotton, tobacco, opium, and raisins enter export trade. West coast moisture holds cotton to within sixty miles of the sea.

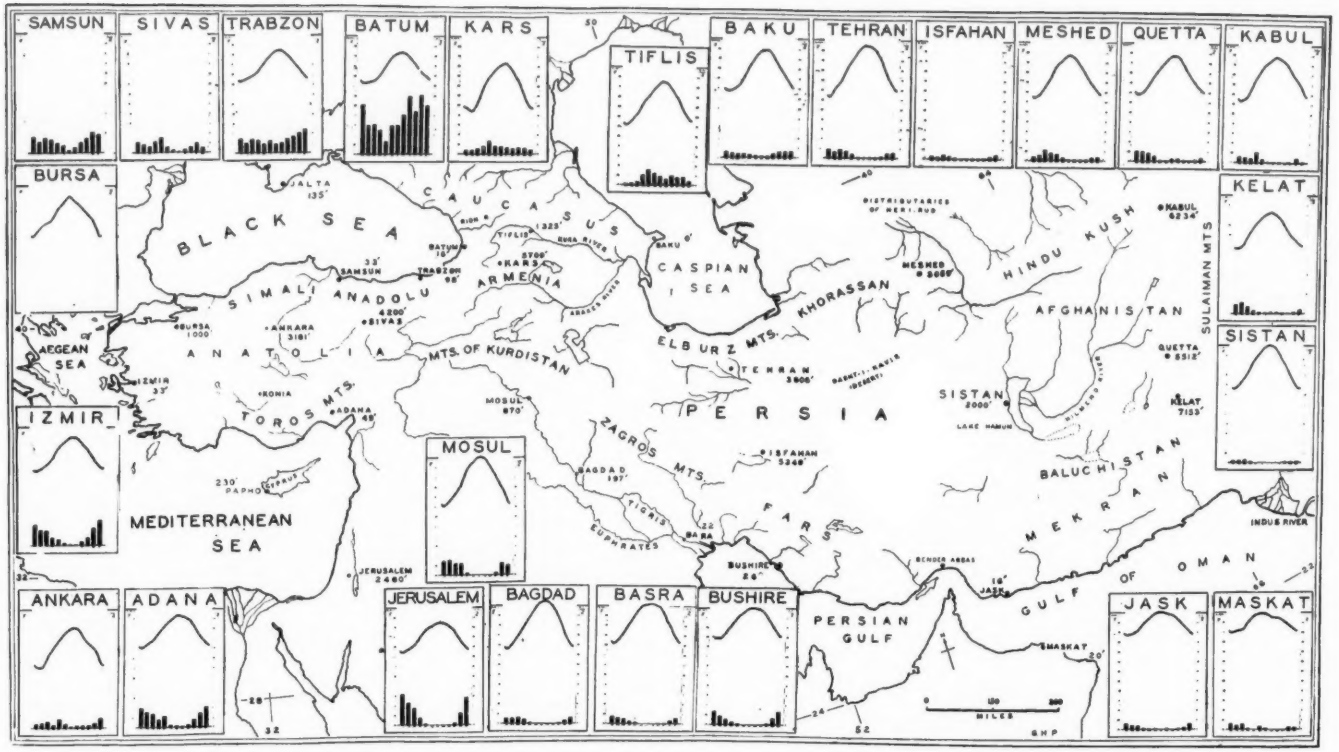

FIG. 1. Alpine Mediterranean Asia. Marginal climatic charts show normal temperature variation and precipitation distribution thru the year. (Data from H. H. Clayton, World Weather Records; C. E. P. Brooks, Climate; and other sources in reference list.)

Fig trees endure slightly more frost than the essential fertilizing insect, limited by fourteen degrees below freezing. In the best producing valley heavy dews interfere with fig drying. Olives grow at higher elevations on south-facing slopes and near the sea. Maqui marks the natural vegetation of less rainy areas. From the cooler moister mountains come lumber, and tannin of the Valonia oak.

The southern coastal belt, cut off from the interior by the rela-

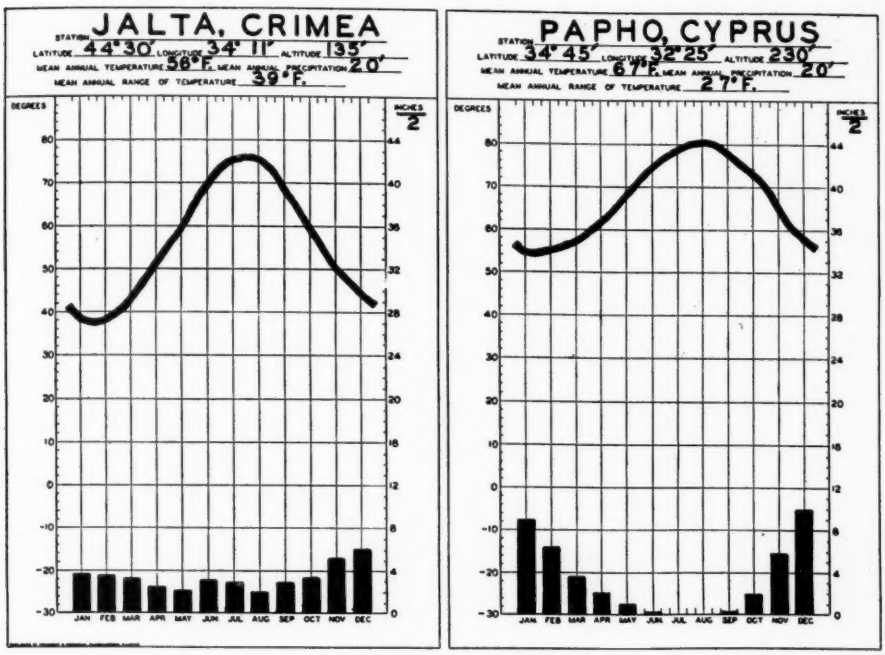

FIG. 2. Climatic charts for Jalta and Papho.

tively narrow but high Toros (Taurus) Mountains, receives very irregular and less of effective rainfall than the north coast. Some persons enjoying winter residence on the lowland go to higher elevations to avoid the humid summer with temperatures approaching one hundred twenty degrees Fahrenheit. A native cotton thrives in summer tho the limited water supply of the Cilician plain does not suffice for a heavy yield. Watermelons grown with cotton decrease available water. Hail also tends to reduce cotton yield. Citrus fruits grow at higher elevations than cotton and scattered olive trees show to above two thousand feet. Maqui characterizes the uncultivated lower dry slopes giving way to chestnut and oak at about two thousand feet and to conifers in the snow zone. Tenting

Yuruks of the Toros descend to low valleys or to the coast for winter.

Bordering mountains of inner Anatolia keep out marine influence, result in reduced rainfall (Ankara, 11"), and make for a great annual temperature range. Reedy shallow lakes shrink to leave miles of salt-encrusted margin in late summer, but fill with spring melting of snow. Meerschaum pits penetrate to two hundred feet before ground water interferes with quarrying. Mud forms the typical building material for houses even in Konia and Ankara. Camel trains crossing between Mediterranean and Black seas encounter deep dust in summer and mud in winter, at which time some upland roads remain closed. Poor pasture, at best of bunch grass, provides a sparse and largely nomad population with wool, meat, and "yogurt" from millions of sheep and meat, milk, and mohair from Angora goats. Rainy slopes and low valleys produce small amounts of wheat and other crops. Some good soil areas, once irrigated, lie buried beneath coarse deposits of the torrential runoff characteristic of arid lands of great relief.

ARMENIA

The Pontic mountains continue eastward to form the northern boundary of Armenia. The rainier western portion of the northern mountains furnishes forest products to lands lying farther south. To the east dense forest with undergrowth of azalea and rhododendron gives way to open grassy coniferous parkland grazed in summer by the flocks of the Tatars of Azerbaijan. Arable valleys, in general, produce crops without irrigation. Deep valleys, cut by runoff from rainiest sections, expose copper ores and other minerals.

The Kurdistan Mountains, eastward extension of the Toros, mark the southern limit of the upland. In distribution of rainfall, forest, and grassland they resemble the mountains of the north. Lowlanders, after their spring harvest, put their animals on mountain pasture until fall snows threaten. People wintering in the mountain valleys occupy stone houses or huts partly excavated in the valley slopes.

Inner Armenia, tho in part forested, consists largely of parched dun-colored steppe but supports a considerable population largely farmers. Dryness of most of the area limits its use to grazing. Crops produce more heavily and more surely on the one-ninth of the cultivable land furnished with irrigation water. Rice grows well in the low hot valley of the Araxes, where draft buffaloes rest deep

in canal water to avoid heat and insects, but at higher levels severe winters may kill grape vines. Summer heat permits vine growing at higher altitudes than in the same latitude in Europe, but some crop land lies too high for cotton. Snow caps of high volcanic peaks furnish much irrigation water. Some plots require drainage be-

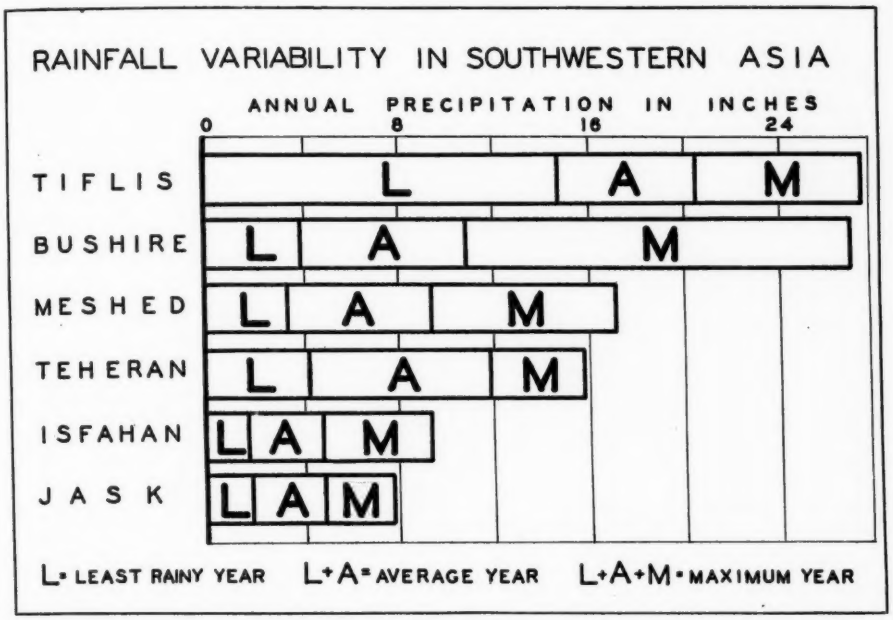

FIG. 3. Graf showing wide departure from the normal of the rainfall of selected stations.

fore irrigation. At least nine of ten dwellers on the lower lands suffer from malaria, a disease afflicting perhaps one-third of the entire population. The government does not allow cultivation of areas most infested by malaria-carrying mosquitoes. Stone and mud houses become so heated under the sweltering summer sun that their occupants use the flat roofs as places for sleeping and for eating morning and evening meals.

TRANSCAUCASIA

Lands lying directly south of the glacier crowned Caucasus, and so protected from the cold winter winds off Russia, present varied climatic conditions, native vegetation, and human utilization. The Rion Basin, the humid western portion fronting the Black Sea, receiving too much rain, especially in summer to classify as typically Mediterranean, carries in places a heavy forest with accompanying azaleas and rhododendrons. Wood serves as the common build-

ing material for houses. Marshy coast lands have few inhabitants except at ports and where drained, but the whole of the western area averages nearly two hundred persons to the square mile. Hills about Chokva produce tea on their moist red soils. Well watered places supply maize, and drier places, wheat.

Eastward of the barrier mountains, pierced by a railway tunnel at some four thousand feet, in the transition area near Tiflis, mountain streams furnish water for a great variety of crops including many melons. Summer heat and intense sunlight make desirable a lounging hour, at which time steel lattices cover Tiflis shop windows. Farther east of the barrier mountains the arid Kura Basin fronts the Caspian. Except during the period of unreliable rains the landscape for the most part shows brown or yellow. Mountain waters make possible a peripheral occupation of the basin. Streams water the vine, peach, pear, mulberry, tobacco, and rice. Some cereals grow in select spots without irrigation. Summer temperatures, attaining 113°F., lead to nomadism of the scant pastoral population utilizing most of the area. Both rain (Baku, 9.5″) and population reach their minimum in that part of Transcaucasia bordering the Caspian.

PERSIA

North winds off the Caspian bring up to approximately sixty inches of rain to drench the Elburz slopes which, in consequence, support a luxuriant forest. Mosquitoes infest and render less hospitable the narrow, marshy coastal plain immediately bordering the Caspian. In spite of cold wave hazard, thru rice, sugar, cereals, tobacco, fruits, and sericulture, the plain supports a relatively dense population. Streams flowing south off the Elburz or the Khorassan, eastward extension from the Elburz of the northern border mountains, lose themselves in the dry interior. The Khorassan mountains show the logical decline in precipitation toward the east, but furnish water to irrigate wheat, barley, and fruits.

Much as the northern, the mountains of the southeast and the southern border show the usual rainfall decrease, the humid Zagros being succeeded to the eastward by the less rainy Fars. The torrid coastal plain along the Persian Gulf, tho highly humid, for long periods receives water only from occasional dews. The few inhabitants live in groups in oases such as Bushire and Bender Abbasi where they specialize in date growing. Since no wood offers, midribs of date palm leaves provide natives with material for rafts. Summer daytime temperatures at times reach well above 100° F.

in Bushire, hence many residents build towers on their houses reaching twenty to thirty meters above the ground; open at the top to catch the prevailing northwest wind the towers serve admirably to ventilate the living quarters below. Winter winds from the west and southwest, at times reaching hurricane strength, necessitate substantial construction of houses and surmounting towers. Europeans in Maskat blow air into their homes thru wetted screens

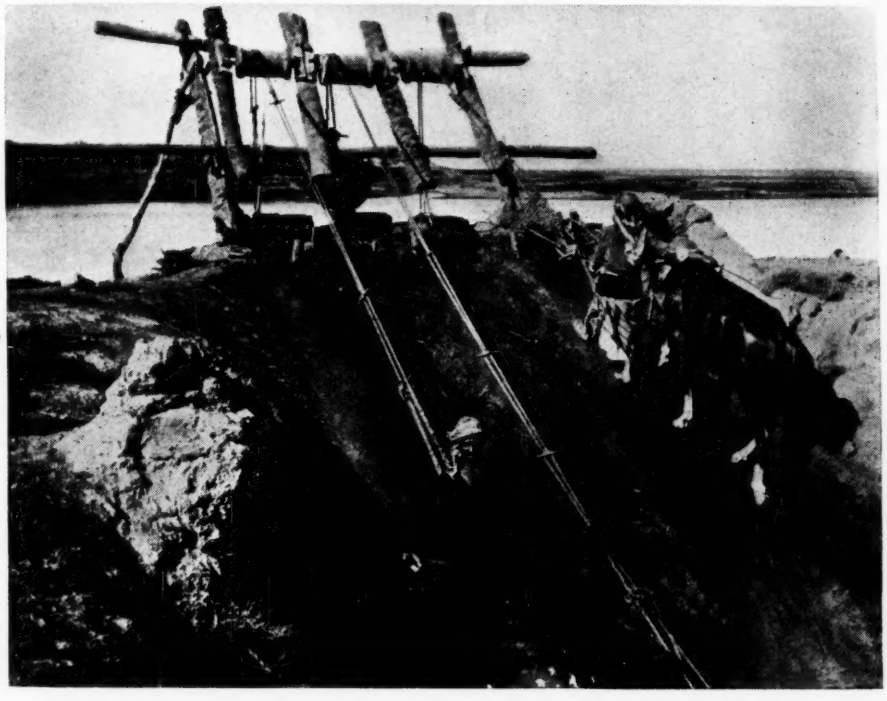

FIG. 4. A Modern Irrigation Project in Persia. Courtesy, Publishers' Photo Service, N.Y.

of grass roots. Jask, five degrees warmer and with less than half the rain of Bushire, functions as a cable station.

The Plateau of Iran or inner Persia possesses the cold dry winter typical of interior highlands and the equally typical hot and nearly rainless summer. The 85° F. July average of Tehran and the winter freezing of fast flowing streams illustrate the great annual temperature range of the area. Dryness of the air results in cool nights even in summer. At elevations of around a mile above sea level air temperatures seldom rise above "blood-heat," but travelers may experience sunstroke even at that altitude if they neglect to provide their heads ample daytime protection. Persians

usually travel when the sun occupies a very low position in the heavens or when it lies entirely below the horizon. Numerous oases fringe the feet of the encompassing and inter-basin mountains; "kanats," long tunnels piercing alluvial gravels, lead the mountain gift of water out into the productive areas. Temperate zone cereals characterize agricultural areas near the northern mountains, rice and dates those nearer the southern. Ground water supplies carry an undesirably large mineral content, but many fruits and luscious melons, in their juices, furnish the equivalent of potable water.

EASTERN MEDITERRANEAN ASIA

The northern mountains constitute a transition from winter to summer rain areas. West of Heri Rud gap grass and scrub vegetation mark the minimum rainfall for mountain area between there and Anatolia; thru the Hindu Kush, Kafiristan and on into the Pamirs, the summer Indian monsoon brings a regular increase in

FIG. 5. Travel and transport methods common in the Near East. Courtesy, Publishers' Photo Service, N.Y.

FIG. 6. Preparing tobacco near Izmir. Courtesy, Turkish Embassy, Washington, D.C.

rainfall. The relatively low longitudinal valley of the Heri Rud for one hundred fifty miles produces poplars, grain, and fruits.

In Afghanistan spring rains succeed winter snows. Transition position shows in the fact that Mediterranean rains at times reach the Punjab and in the report of one hundred centimeters of monsoon rain at Kabul in four August days of 1923. Summer dryness, tho less pronounced than that of the interior Tarim Basin, prevails except on mountains. A European traveler reported marching at night; since daytime temperatures in his tent approximated at times 120° F. his party found but little rest possible. Strong northwest winds blew the tent away and literally buried some of the men in sand. The party hastened from the intense heat of Hilmend Valley to the cool but comparatively barren mountains west of Quetta. Low mountain valleys and piedmont zones of Afghanistan provided with "kanat" irrigation form the best agricultural areas of the country. In times of need nomads of the higher grasslands, normally living from cattle, sheep, and camels, raid the agricultural settlements. Afghan houses, typically of clay, shed water readily from their domed roofs built strong enough to support any probable weight of winter snow. Some streams, in winter, carry potable water down to near the Persian border; water in the same streams, at summer concentration, people find altogether undrinkable. A

common type of Afghan turban carries a dependent flap which protects the back of the wearer's neck from intense sunlight.

The Sulaiman Mountains present a formidable barrier between the plains of the Indus and inner Afghanistan. They rise brown and barren except where a few green patches on the higher portions mark dampness from occasional fog and rain. Near Khyber Pass, where the summer monsoon brings additional rain, surplus water irrigates valley fields and orchards. Some of the higher parts of the Sulaimans carry pine forest but some of the mummulitic limestone ridges around eleven thousand feet high do not retain water.

The Baluchistan province of Mekran includes mountain area and the discontinuous strip of sandy foreshore between Persia and Sind. With three to six inches annual precipitation typical, population remains scant. Scattered date palm oases furnish homes for sea fishermen. With the exception of the valley of the Kej River, and that of its affluent, the Bolida, Mekran contains but tiny agricultural areas. Percolating subterranean waters moisten a few spots on the slopes enough to produce wheat, millet, and a little fruit. As on the dry Fars of Persia nomadic herdsmen utilize the scant herbage on summer pastures of the heights.

Inner Baluchistan resembles the basin areas of Afghanistan and of Persia. Its eastern part forms a transition between Persian conditions and those of the Punjab. As in India temperatures rise highest in spring rather than in autumn. The small amount of rain arrives late in the summer monsoon period or in winter. Observers report plowing done in December with camels, followed by winter seeding. Precipitation from December to March forms the usual chief dependence of crops, typically harvested in June. As in other dry basin areas dust storms may preclude seeing more than a few meters.

In the Sistan area around Lake Hamun the "120-day wind" blows from west of north beginning about the end of May and lasting till October. Its maximum strength exceeds seventy miles an hour, so that the area at times becomes a pandemonium of noise and dust. Good results of the wind include: (1) driving off the insects which become almost unbearable before the wind sets in, (2) diminishing the heat and more especially the sensible temperature, (3) freeing the land from disease such as typhus, (4) possibly removing enough salt from the dry lake bed margin to help in keeping Lake Hamun fresh, and (5) operating windmills. "Blizzards" come in winter, one in late March blowing eighty-five miles an hour for

sixteen hours. Such storms render tree growing impossible. Watermelon vines, in places, point south almost as reliably as a compass. North-south walls of the ruins of old Sistan yet stand, tho gradually wearing thinner, but east-west walls long since fell and the remnants largely blew away. In summer well-to-do residents of the Sistan area have water constantly sprinkled on screens of twigs before their doors. Dryness of air reveals itself when, at

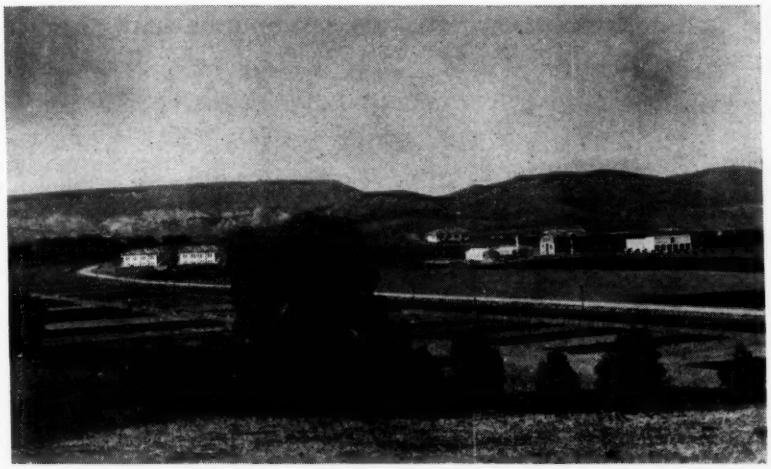

FIG. 7. Dry Farming Project near Eskisehir, Turkey. Courtesy, Turkish Embassy, Washington, D.C.

night, considerable light shows as paper tears or when mules switch their bodies with their tails.

From the distant snowy Hindu Kush the Hilmend River brings water to form Lake Hamun. The lake measures but three feet deep five or six miles from shore, but waters on their way to join it support three groups of people in the desert area of Sistan. Some of the swampy tracts around the lake grow a wiry grass which furnishes forage for the flocks of nomads. Since the hot summer finds the flocks in the lowland area of water and food supply this constitutes an unusual sort of transhumance. With the coming of winter rains in the mountains the upward movement of the nomads and their flocks takes place. About the beginning of May rain, grass, and springs fail in the high area and the herdsmen pitch their tents again at Sistan. Other swampy sections around Lake Hamun carry a growth of reeds, which serve as house material for the local population and for the "canoes" in which natives hunt wild fowl. The reeds furnish cover for the ducks, geese, and pelicans as well

as for the humped cattle which feed on the coarse vegetation. Most of the people of Sistan, however, engage in farming and occupy the plain bordering the outer margin of the swamp. Annually they build a dam of tamarisk bushes to divert Hilmend waters over the plain thru a system of canals. They plant in February and reap in April. Later each summer the more rapid melting of Hindu Kush snow sends down a flood that removes the dam; but the cycle continues for the annual growth of tamarisk bushes suffices for the cutting of material for a new dam each autumn, normally the time of the lowest stage of the river.

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THE VALUE OF CERTAIN TECHNIQUES USED IN CONNECTION WITH STUDY HELPS IN GEOGRAPHY WITH PUPILS IN BEGINNING FOURTH GRADE CLASSES

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The use of study helps by grade school pupils has become an integral part of the conduct of a great many classes.

In order to determine the value of certain rather commonly used techniques in connection with the study of geographical material, all of the beginning fourth grade pupils in three successive semesters of the Richmond, Indiana public schools participated in the following experiment.

PROBLEM

To determine whether or not beginning fourth grade pupils remember geographical material more effectively if they are required to write the responses to the study helps in connection with the study of the material than if they are not required to write the responses.

SECONDARY PROBLEMS

To determine whether or not beginning fourth grade pupils remember geographical material more effectively in the study of which they have written the responses to the study helps and corrected their own responses than they remember geographical material in the study of which they have written the responses to the study helps and the responses have been corrected by the teacher.

MATERIAL USED

The unit "The Land of the Two Great Rivers," pages 1 to 24 "A Travel Record" on page 24 of "Journeys in Distant Lands," Barrows & Parker.

Study sheets made out by the writer. Whenever possible, study helps given in the unit were used. They consisted of such types as (1) false and true statements, (2) blanks to fill with words or phrases, (3) questions to answer, (4) picture study for geographical content, (5) geographical puzzles, (6) multiple response, (7) map study, and (8) vocabulary study. In all, there were sixteen study helps used by all three groups.

TIME

A six weeks' period at the beginning of each of the three semesters—spring 1931-1932, fall 1932-1933, spring 1932-1933, during which time a period of 35 minutes daily was spent on geography by the beginning fourth grade pupils. The 35 minute period included both study and discussion. Approximately one half the time each day was taken for study and one half for class discussion.

TESTS USED TO CHECK RESULTS

The Fourth Grade Geography Tests of Toledo, Ohio, were given to every group at the end of the period and after three weeks of time had lapsed. During the three weeks, no definite review over the material included in the unit was given. There were four tests in the group.

The National Intelligence Test, Form A, was given to all pupils in every group included in a report of the study.

Procedure 1	Procedure 2	Procedure 3
Spring semester 1931-1932	Fall semester 1932-1933	Spring semester 1932-1933
Study	*Study*	*Study*
Pupils were asked to read a given section over once rapidly.	Same as Procedure 1.	Same as Procedure 1.
Pupils received the mimeographed sheet of study helps covering the section just read.	Same as Procedure 1.	Same as Procedure 1.
Pupils re-read the section with the study helps in mind as they read. The pupils were encouraged to try to formulate the answers in their own minds.	Pupils re-read the sections and wrote out the answers to the study helps.	Pupils re-read the section and wrote out the answers to the study helps.
	Pupils received a list of correct answers by means of which they checked their own answers marking the correct answers "C" and the incorrect answers. "X." The pupils were told that the checks were for their help only that no effort would be made to determine how well or how poorly they had checked their own papers. If a pupil found any of his answers wrong he was encouraged to go back and find the place in the section where the answer was given.	

Procedure 1	Procedure 2	Procedure 3
The teacher collected the study sheets.	Same as Procedure 1.	The teacher collected the study sheets and corrected the papers before the period for class discussion on that particular section arrived.
Class Discussion The study sheets dealing with the particular section to be discussed and which they had used in their study period were returned to the pupils.	*Class Discussion* The study sheets dealing with the particular section to be discussed and which the pupils had used in their study periods by writing the answers and checking them were returned to the pupils. The teacher had not inspected the papers.	*Class Discussion* The study sheets dealing with the particular section to be discussed and which they had used in their study period by writing the answers were returned to the pupils. The teacher had corrected the papers in colored pencil marking all answers correct with a "C" and all answers incorrect with an "X."
The pupils were asked to put no marks on the study sheet during the class discussion.	Same as Procedure 1.	Same as Procedure 1.
The class discussed the section that had been studied. An attempt was made to cover every point in the study sheet in the discussion.	Same as Procedure 1.	The class discussed the section that had been studied. An attempt was made to cover every point in the study sheet in the discussion. Care was taken to direct the discussion so that every pupil making any errors on his study sheet had the opportunity to learn what the correct answers were.
Points other than those included in the study sheet were included in the discussion.	Same as Procedure 1.	Same as Procedure 1.
Pupils were encouraged to ask questions concerning any point not understood and to contribute interesting and worthwhile information not given in the text.	Same as Procedure 1.	Same as Procedure 1.

Procedure 1	Procedure 2	Procedure 3
All review work was oral. There was no written work during any class discussion period.	Same as Procedure 1.	Same as Procedure 1.
There was no oral reading of the text during class discussion period except when it was necessary to clear a point about which there was some misunderstanding.	Same as Procedure 1.	Same as Procedure 1.
At the end of the class discussion period, the study sheets were again collected.	Same as Procedure 1.	Same as Procedure 1.
Checking Results All low fourth grade pupils were given the Toledo "Fourth Grade Geography Test over The Land of the Two Great Rivers, Form B" during the class period which followed the discussion based on the last study sheet.	*Checking Results* Same as Procedure 1.	*Checking Results* Same as Procedure 1.
For the purpose of the study, only those pupils who had been in the classes during the entire period and those who were studying this unit for the first time were considered.	Same as Procedure 1.	Same as Procedure 1.

TABLE I

Results of Tests Given Immediately at the Close of the Study

No. pupils included—170			No. pupils included—148			No. pupils included—167		
	Mean Score	σ		Mean Score	σ		Mean Score	σ
Test 1	6.20	1.60	Test 1	6.22	2.33	Test 1	6.52	1.23
Test 2	12.91	5.50	Test 2	14.09	5.18	Test 2	15.52	5.09
Test 3	4.65	1.76	Test 3	4.66	1.75	Test 3	4.96	1.63
Test 4	8.26	1.42	Test 4	8.12	1.53	Test 4	8.13	1.48

At the end of a three weeks' period, the tests were again given to all low fourth grade pupils. The same pupils included in the tests

on the first trial were included in the second trial of the tests and only those pupils.

TABLE II

Results of Tests Given Three Weeks After the Close of the Study

No. pupils included—170			No. pupils included—148			No. pupils included—167		
	Mean Score	σ		Mean Score	σ		Mean Score	σ
Test 1	6.28	1.48	Test 1	6.45	1.80	Test 1	6.33	1.38
Test 2	13.93	5.62	Test 2	15.03	5.39	Test 2	15.83	5.08
Test 3	4.94	1.67	Test 3	4.91	1.62	Test 3	5.44	1.15
Test 4	8.12	1.49	Test 4	8.40	1.34	Test 4	8.32	1.23

During the first six weeks of the low fourth grade semester, all low fourth grade pupils were given the "National Intelligence Test, Scale A, Form 1." The pupils included in the study were the pupils attending school during the entire study and taking both the first and second sets of geography tests.

TABLE III

Results of the National Intelligence Test, Form A

No. pupils included—170		No. pupils included—148		No. pupils included—167	
Mean I.Q.	102.94	Mean I.Q.	106.09	Mean I.Q.	104.91
σ	14.50	σ	15.52	σ	16.10

SUMMARY

1. A study of the means shows that on all of the tests measuring immediate recall (Table I), except one, "Test 4," a test measuring pupils' ability to choose correct reasons in a relationship test, the beginning fourth grade pupils who wrote the answers to the study helps did better than those fourth grade pupils who did not write the answers. In "Test 1," a test measuring pupils' knowledge of geographical terms and in "Test 3," a test involving the ability to find false and true statements, the difference is slight. In "Test 2," a map test, the difference is more noticeable.

2. A study of the means shows that on all of the tests measuring delayed recall (Table II), except one, "Test 3," the beginning fourth grade pupils who wrote the answers to the study helps did better than those fourth grade pupils who did not write the answers.

3. A study of the means made by those pupils who corrected their own study helps and by those pupils whose study helps were corrected by the teacher (Procedures 2 and 3), shows that in all of the tests measuring immediate recall, and in all of those measuring de-

layed recall except one, "Test 1," those pupils whose papers were corrected by the teacher did better than those pupils who corrected their own. There is a difference, however, in both the number of pupils involved and in the mean I.Q.'s of the two groups. This difference may have something to do with the results at shown in Table III.

4. This experiment is of course not considered final. There should be, in the writer's opinion, many such experiments under controlled conditions to determine, if possible, the value of study helps and the techniques involved.

EDITORIAL NOTES AND NEWS

About ten million Christmas trees were harvested this year in the United States for the Christmas holidays. Those cut from the national forests bore a tag carrying a message of good will and an assurance that the trees were cut under supervision from a crowded stand.

Shipments from Florida of beans, peppers, tomatoes, and other fresh vegetables will be very light due to the severe freeze, the worst in years, which in the early winter practically wiped out entire trucking areas. In some areas strawberry bloom was killed, potato vines frozen, but damage to citrus fruits could not be estimated until a later period.

According to a recent release from the U. S. Department of Commerce, almost four million persons visited our National Parks in 1934, a record-breaking year for visitors.

In July, 1935, the supervision of the Wichita National Forest and Game Preserve will be delegated to the Biological Survey in order to provide a laboratory for wildlife research under field conditions. Among the wild life being propagated are western range longhorn cattle, buffalo, elk, deer, and wild turkeys. The research covers life and feeding habits, diseases and parasites, range carrying capacity, damages by rodents and predatory animals.

Last season, nearly half a million duck-hunting stamps at $1.00 each were sold to all waterfowl hunters over 16 years of age or to stamp collectors. The revenue from these sales will be used to further the establishment of game refuges. Minnesota with a total of 40,000 led in numbers sold, followed by Wisconsin and Illinois.

The destructive power of erosion accompanying the 12 inch rain on the burned-over foothills of the San Gabriel Mountains last year actually moved boulders weighing tons along with the torrents of mud that resulted in the loss of 30 lives and 483 homes in Montrose, California. A boulder weighing 59.5 tons that was deposited on the highway had to be blasted before removing. Those canyons which were not fire swept in which erosion prevention had been set up showed very little damage from the deluge of rain.

Chief Forester Silcox of the Forest Service, U. S. Department of Agriculture, speaking recently at the Land Grant College Conference in Washington, D.C., reported that about 50 per cent of the scientist and laymen writing the Service are enthusiastic about the Shelterbelt project, whereas 30 per cent are skeptical and 20 per cent opposed to it. He is of the opinion that the present two million acres of shelterbelts in the Plains

States indicate success for the new shelter belt project provided the drought of the past few years is broken and the normal precipitation does not fall below 18 inches. This belt if established will not prevent droughts, only lessen them. Wind velocities will be reduced, snows will not be whipped away into coulees, temperatures will be less extreme, wild life will have added cover protection, the landscape will be improved, and farm life of the plains thereby raised to a higher level.

Dr. David J. Swartz, 899 Tenth Avenue, New York City, is chairman of the Geography Section of the N. Y. Society for the Experimental Study of Education which a year ago sponsored a two-year survey of the teaching of geography in elementary junior and senior high schools. Dr. Swartz led in one of the conferences in opposing a fusion of geography along with history, civics, and economics in a single social science course and presented a summary of his objections to fusion in a letter, dated May 29, 1934, sent to New York's Board of Superintendents.

According to J. B. Kincer of the U. S. Weather Bureau, July temperatures set an all-time record for the Middle West and Southwest. The nearest approach in the sixty year record was in July, 1901. Moreover, July's heat was preceded this year by very high temperatures in June which was not the case in 1901. Then, too, never has so little rain fallen over so wide a territory thruout the entire growing season as in the year 1934.

From the geological survey of Minas Geraes comes a new map (1932) of the area about Itapecerica. The scale is about one inch to one and a half miles. It shows the usual features of relief, drainage, vegetation, and culture shown on the U.S.G.S. maps.

A symposium of articles on the T.V.A. (Tennessee Valley Authority) appears in the December issue of the *Journal of the National Education Association*, Vol. 23, No. 8, December, 1934.

A new set of maps (one for each state) completed by the Bureau of the Census showing the minor civil divisions in each county and the location of all incorporated places with the areas of the larger places delimited is available at ten cents each from the Superintendent of Documents, Washington, D.C.

Five new bridges of major importance designed to shorten distances between industrial centers or eliminate waste of time involved in ferry crossings will be a part of our new transportation development. San Francisco Bay will be spanned by the San Francisco-Oakland Bridge and the Golden Gate Bridge. New Orleans is to have its first bridge across the Mississippi River, and Newport, Rhode Island, will have easier access to New York by bridging Narragansett Bay, while the tide-swept Columbia will be crossed at Astoria. Denmark, too, is solving part of its transport problems by bridging the Little Belt between Funen and Jutland. Ultimately it expects to bridge the Great Belt and thus have direct rail connections with Copenhagen.

Chemists have long known that sea water contains bromine, but it was not until last year that the extraction was made on a commercial scale. One company has its plant on a narrow peninsula a little above the mouth of the Cape Fear River, a few miles below Wilmington. This site is peculiarly favorable since the sea water there is free from sewage and industrial pollution, and the waste water from the plant can be discharged in the river across the peninsula so as not to dilute the incoming sea water. The demand for bromine has been greatly increased by its use in ethyl gasoline. Naturally, one wonders what the next yield of the sea will be. Will it perchance be gold?

A GEOGRAPHY TEST

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The following test has been successfully given to pupils of grades five and six at the beginning of the term for diagnostic purposes, and also at intervals thruout the school year as a review and check on work covered.

The material included in the test is general in most items and therefore suitable to all parts of the United States. Where mention is made of a specific city (Dubuque), which does not mean much to most people of the United States, other cities may be inserted.

Select the best answers:

1. The imaginary line which is just as far from the North Pole as it is from the South Pole is called the (Tropic of Cancer—Equator—Tropic of Capricorn—Arctic Circle—Antarctic Circle).

2. People living at the equator can see the noon sun right overhead (all the year around—twice a year, in September and in March).

3. People living near the equator (always—sometimes) see the noon sun *high* in the sky.

4. People of the United States (can sometimes see—can never see) the noon sun directly overhead.

5. Forty degrees north of the equator covers the same number of miles as (40°—60°—23½°) south of the equator.

6. Every degree of latitude is about (70 miles—10 miles—40 miles).

7. If a place is in latitude 40°, it is about (250—2800—4500) miles from the equator.

8. A place 70° north or south of the equator should suggest a land of (long, hot summers—long, cold winters and short summers).

9. (None—a little—much) of the United States is south of the Tropic of Cancer.

10. (All—most—none) of the outlying possessions of the United States are between the Tropics of Cancer and Capricorn.

11. The Arctic Circle crosses (Mexico—Alaska—United States).

12. People living at the Tropic of Cancer can see the sun directly overhead in (December—June—March—September).

13. People living at the Tropic of Capricorn can see the sun directly overhead in (December—June—March—September).

14. Most of the island possessions of the United States are in the (Pacific—Atlantic—Indian) Ocean.

15. Places between the Arctic Circle and the North Pole have daylight as long as (24 hours—8 hours—15 hours) during our summer.

16. Where we live we have daylight in summer as long as (24 hours—9 hours—15 hours).

17. A place 65° north of the equator (could be—could not be) in the United States.

18. A place 30° north of the equator (could be—could not be) in the United States.

19. A place 30° south of the equator could be in (United States—Mexico—South America).

20. We see the noon sun highest in the sky during (summer—winter).

21. People of Europe always see the noon sun in the (southern—northern) sky, because they are (north—south) of the sun lines.

22. Cairo, Egypt, is in about 30° north latitude.
Dubuque, Iowa, is about 42° latitude.
Tokyo, Japan, is about 35° north latitude.
The city nearest the equator is (Dubuque—Tokyo—Cairo).

23. The higher the noon sun is in the sky the (shorter—longer) will be our shadow at that time.

24. We see our longest shadow during (December—June—September) because at that time of year the sun is (highest—lowest) in the sky here.

25. The North Pole is at 90° north latitude. A place one third of the distance between the equator and the North Pole is in latitude (45°—30°—20°) north.

26. The South Pole is at 90° south latitude. A place half way between the equator and the South Pole is in latitude (45° S.—20° S.—30° S.).

27. If we were at the North Pole we could see the North Star overhead. Where we live the North Star is not directly overhead. The farther (North—South) we go, therefore, the more nearly overhead will we see the North Star.

28. (June, July, August—December, January, February) are the best months to explore the regions of the South Pole because at that time the days are 24 hours long.

29. Between March 24 and September 20, the sun does not shine at all at the (South Pole—North Pole).

30. Between September 27 and March 10, the sun does not shine at all at the (South Pole—North Pole).

31. Which city is nearest the North Pole?
Hammerfest at about 70° N.
Bergen at about 60° N.
Juneau at about 58° N.

32. Boys in Alaska can play ball until ten o'clock and later at night in summer because (they have a longer summer—they have longer summer days).

33. When it is 9 o'clock in Dubuque, it is (7, 8, 9, 10) o'clock in Washington, D.C.

34. When it is 9 o'clock in Dubuque, it is (7, 8, 9, 10) o'clock in Denver, Colorado.

35. When it is 9 o'clock in Dubuque, it is (7, 8, 9, 10) o'clock in San Francisco.

36. The games for the World Series begin at 2 o'clock in New York City. In Dubuque it is then (12, 1, 2, 3) o'clock.

37. Crops can be grown in countries far to the north because the (summers are longer—the sun shines many hours).

38. Christmas Day would be shortest in which of the following cities?
Juneau in Alaska 58° North
New Orleans in Louisiana 30° North
Singapore in Malaya about 1° North

39. Where would the people have an electric light bill of about the same amount thruout the year?
In Dubuque where the days are short in winter and long in summer, or,
In Quito, a city in South America right near the equator?

40. People who wish to explore in regions near the North Pole should go between:
(March and September)
(September and March)

GEOGRAPHICAL PUBLICATIONS

Isaiah Bowman. **Geography in Relation to the Social Sciences**; and Rose B. Clark. **Geography in the Schools of Europe.** Part V of the Report of the Commission on Social Studies of the American Historical Association. 382 pp., 55 figs. and 17 plates; Scribner's N.Y. 1934.

To the teacher confused by the changing attitude of geographers toward the objectives and methods of their science, and to those more intolerant proponents of special, narrowly-restricted definitions of the subject this new book by Dr. Isaiah Bowman can bring clarity and sanity. With his usual vigorous style the author has given us a report on the present state of geography by reviewing critically the recent productions of the "creative writers" in the subject. Avoiding the error of inviting allegiance to any one theory of content or method, Dr. Bowman exhibits in proper perspective the more important currents of thought and opinion which have brought to our field "a healthy," if confusing, "diversity." After an introductory chapter entitled "By the Way of Definition," the author discusses the importance and the techniques of "Measurement in Geography." He urges the essential rôle of the map in geographical studies, pointing out that "almost any statement respecting man, beyond the simplest generalizations . . . has immediately to be localized if it is to be given meaning." In a chapter on "Population and Land Studies" he suggests practical problems of population and land use to which geographers can and must make important contributions. He maintains that geography plays no rôle more vital than in the survey and interpretation of existing resources and forms of utilization. A chapter on "Technique in Geographical Analysis" leads to a discussion of "Regional Geography." The regional concept, as the author points out, is one of the most significant contributions of geography; in fact, the regions themselves "may be considered as generalizations or laws," in other words, as principles of geography. The last chapter deals with "Economic and Political Bearings," after which there is a concluding summary.

In spite of his sympathetic treatment of the diverse methods and techniques of the various geographers, Dr. Bowman gives no quarter to the easy, uncritical generalizations which have made of so much elementary education "a mere noise in the throat." Every prospective writer of a geographic textbook should read and commit to memory the paragraph on page 55. The author is a realist, who sees in the field of geography the opportunity to attack real problems, and who has little patience with the confused obscurities of "fuzzy minded" writing. In the field of education he urges the importance of independent discovery by the student. "The recapture of the sense and thrill of discovery is a major teaching objective," he writes.

The second part of this report is a study of "Geography in the Schools of Europe," by Rose B. Clark. The place of geography in the curriculum is discussed by countries. This is followed by studies of the declared objectives, the plans of teaching, the content of the courses, the textbooks and other equipment used, and the training of teachers. A chapter entitled "What We Can Learn from Europe" is of great importance to American teachers and merits a wide reading. Geography seems to be more solidly grounded in European than in American schools. The better training of teachers is suggested as one of the chief reasons for this; for most of them have received extensive training in geography under the direct inspiration of the leading research workers in the field. "With but few exceptions, every pupil in a secondary school in any country of Western Europe is required to take several years of continuous, unified training in the subject, usually under a teacher who is a specialist." Geography is vitalized by giving much attention to the use and understanding of maps, and to fieldwork in local areas.

All of these things hinge largely on the training of teachers as specialists in geography. Since it seems that "geography is passing thru the same stages in American thought as it has passed thru in European philosophy" we can learn much from the experiences of these other countries. Miss Clark's contribution ends with an extensive bibliography.

Dr. Bowman writes, "a scientific attitude of mind is an experimental attitude of mind, a revisionary or liberal attitude." In this spirit every teacher of geography who wishes to keep up with modern trends in the subject should read this book.

PRESTON E. JAMES

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H. C. Knapp-Fisher. **The Modern World: A Pageant of Today.** 447 pp. 14 illustrations. E. P. Dutton & Co., Inc., N.Y. 1934. $2.50

While reading this book, one feels indeed that he is having a "world tour" and that he is visiting homes, factories, mines, farms, plantations, and government buildings in all the countries of the world. He reads about the wealth and natural resources of the several countries, the kinds of work people in different lands are doing, the kinds of laws and governments they have, the articles they buy and sell, and the ways in which they trade with other countries.

The material is interesting and well-written, the descriptions are vivid and clear, and the problems discussed are those confronting the world today. The reader finds that he is given a definite picture of life, work, and problems in lands such as Yugoslavia, Scandinavia, the Rhine Valley and Germany's "three very solid doorsteps," the prairie provinces of Canada, and the French countryside.

Pictorial maps appear thruout the book. They are inaccurate and misleading as is true of most maps of this type. A catchy heading at the top of each page captures the reader's interest, and also gives a brief word picture of the ideas developed on the page.

However, the geographer finds but little material in the book which would make it valuable as a supplementary book for the geography class. For instance, one reads: "The Hungarians are mostly a country people"; "Vegetables can be grown all the year round far more easily in North Africa than in Europe." Such statements capture the interest of the student of geography and he finds himself looking eagerly ahead for the author's attempt to show a relationship between such facts and the natural environment. Very rarely does he find any such relationship ideas expressed. The author does give some very definite reasons which help to show why Chicago has grown to be the second city in size in North America, and why San Francisco has become the world's greatest fruit market; but when he writes about New York City, he simply says, "It just so happened that in this city most of the wealth of the whole land gathered and so, of course, the people gathered here too, and it grew into the second city of the world." The geography student feels that certain very definite reasons have contributed to the growth and development of New York City, and that to say "It just so happened" is to slide over some very vital and worth-while relationships.

Since the author makes no special attempt to show how man's work and life in the various countries of the world are tied up with elements of his natural environment, "The Modern World—A Pageant of Today," would not be especially valuable as a supplementary book in geography classes. However, the youthful reader may find the book interesting and also useful as a source of information about certain aspects of life in the several countries of the world.

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Margaret Reid Shackleton. **Europe: A Regional Geography.** 430 pp. 106 maps and photographs. Longmans, Green & Co., N.Y. 1934. $6.00

This book, as its name implies, is a regional survey of Europe. The structural, relief, climatic, vegetative, and economic phases are well interwoven but are in many places almost encyclopedic in terseness. "The treatment," as the author states in the preface, "is fundamentally physical, for (it is believed) that a knowledge of structure is even more necessary to geographers than anatomy to the artist" and that "the knowledge of physiography and form of the earth's surface are incomprehensible without knowledge of the solid bones of the structure beneath." The book in no way stresses the geology of Europe; yet a few geologic maps are presented. As with most European geographers, the author believes that the correlation of relief, climate, and vegetation is good geography. The emphasis thruout is on the physiographic phases of geography, but human relationships, past and present, are skilfully woven into the landscape treatment.

Perhaps it is English modesty that led the author to slight her own country in length of treatment. To American teachers this will be considered a serious defect, for we hardly think of Europe without the British Isles.

The physiographic regions are treated in far greater detail than American students are accustomed to demand. The book will serve admirably as a basal text in a course in the physiography of Europe and as a supplementary text in courses in regional economic geography as we know the terms in the United States.

One admirable feature of the book is its many maps and excellent illustrations; yet for the average American college student it is lacking in at least some half dozen good place-name maps.

The line drawings are typically English in their crudeness of draftsmanship, yet highly effective. There is a dearth of climatic maps. The half-tone illustrations are well chosen. They are largely physiographic in keeping with the underlying motif of the book.

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Alois Fischer. **Geographisch-Statistisches Handbuechlein, 1935.** 56 pp. G. Freytag and Berndt A. G., Wien. 1934. 3.15S

This little handbook presents a large amount of useful information in a very concise form. Data for each country is arranged in a uniform tabular style and includes, information concerning the ruler, size of country, population, principal cities, finance, leading products, and trade. In addition general world information includes race, religion, language, land and water areas, and armaments. Several black and white maps deal with current problems such as Spanish minorities, distribution of European population stocks, interests of various countries in Arabia and adjacent parts of Africa, and similarly in central and eastern Asia, and the boundary problem of Bolivia and Paraguay.

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